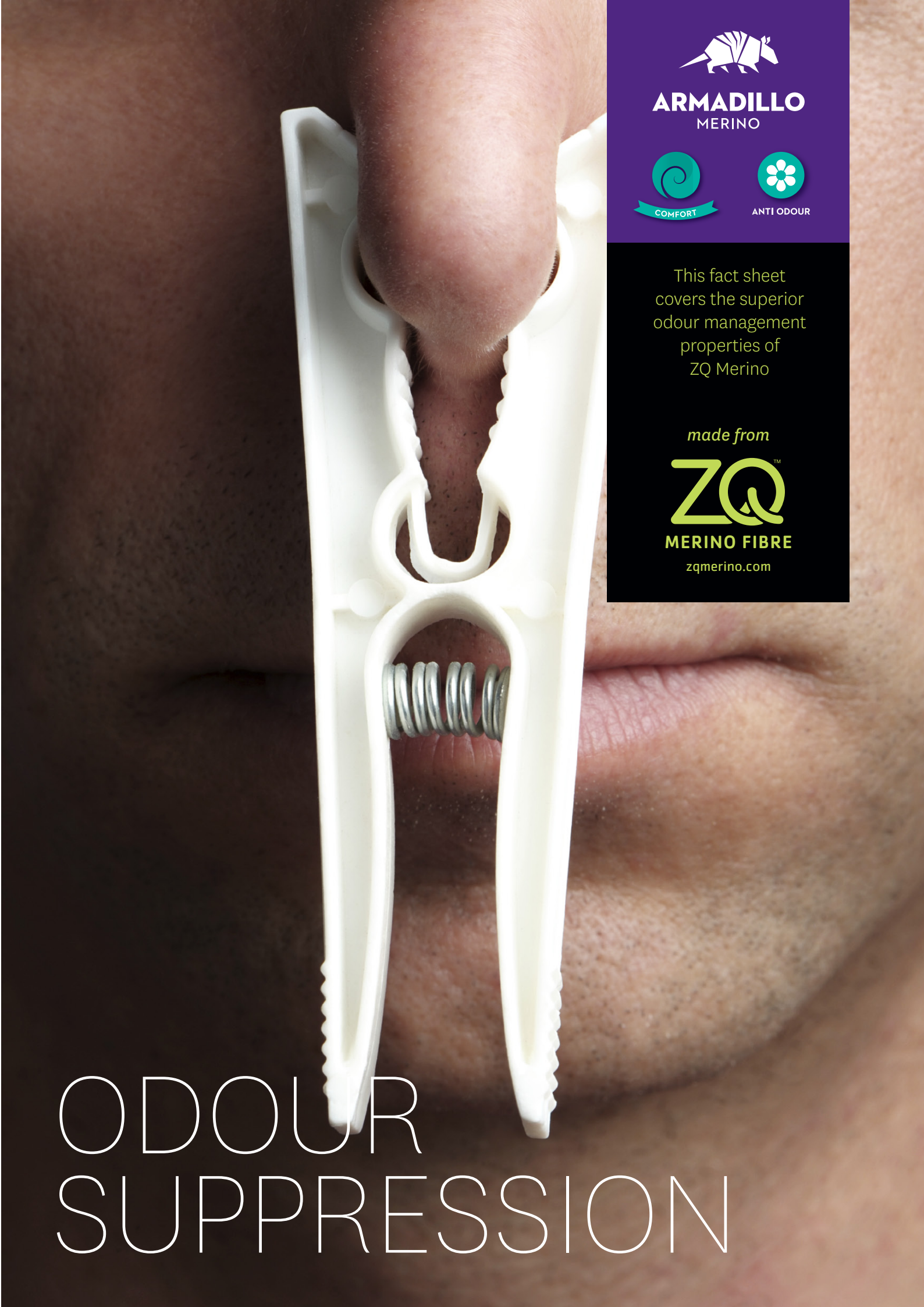

ARMADILLO
MERINO

COMFORT

ANTI ODOUR

This fact sheet covers the superior odour management properties of ZQ Merino

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ZQ™
MERINO FIBRE
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ODOUR SUPPRESSION

INTRODUCTION

Cleanliness and hygiene are highly important components of good social behaviour. In many day to day circumstances this can be indicated by the presence and/or absence of body odour. From time to time individuals may be isolated from facilities to regularly launder clothing, or be engaged in activities that cause profuse sweating. This includes sporting activities, professional risk takers such as the military, armed or emergency services, and isolated workplace employees. In these circumstances, it is a significant benefit to have access to apparel that assists in mitigating the natural odour that will result from such activity.

Wool has a unique and natural ability to manage offensive odour, a propensity that has been independently researched and validated by a number of research institutes, including the Wool Research Organisation of New Zealand and the University of Otago. Many other textiles make similar claims, however in these cases odour management is typically imparted through the addition of anti microbial chemical treatments. Wool fabrics do not need additional chemical treatment and will retain odour management capabilities for the duration of the garments life.

PROBLEM STATEMENT

(CAUSES OF ODOUR)

Sweating is the tool the body uses to regulate its temperature. This occurs through the process of evaporation of sweat from the skin, cooling the skin surface. The human body has more than 3,000,000 sweat glands which continuously secrete moisture.

Body odour occurs as the result of the build up of bacteria and micro organisms on the skin and/or in worn clothing. While sweat does not have any odour, if sweat is allowed to remain on the skin for a period of time, bacteria are likely to proliferate, creating the body odour that many find offensive. Such body odour is due largely to volatile fatty acids produced by these bacteria as a waste product.

To minimise such odour, a garment must either reduce the amount of sweat secreted, be regularly changed for clean garments, or alter the skin and fabric environment to reduce its suitability as a habitat for bacteria and other micro organisms.

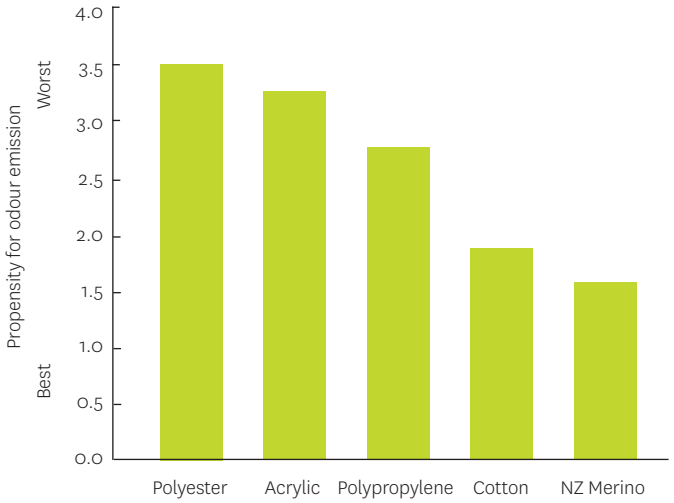


Figure 1. Propensity for odour emission from socks constructed of differing fibres

PREVIOUS OPTIONS

(LIMITATIONS OF OTHER FIBRES)

Merino wool outperforms competing fibres in terms of its resistance to the build up of odour. This has been anecdotally testified by many elite and endurance athletes and professional risk takers.

This anecdotal endorsement is supported by numerous scientific studies. The Wool Research Organisation of New Zealand (WRONZ) used a celebrated panel of human noses to compare the effect of different fibre types on odour. They found that the odour generated on wool socks during active use was significantly less objectionable than that of other fibres (Figure 1 above). Similarly, apparel fabrics were examined by researchers at the University of Otago with a similar result. Fabrics constructed from wool exhibited a significantly lower propensity for odour emission after wear than polyester fabrics of a similar weight and construction (McQueen et al 2007 a,b)

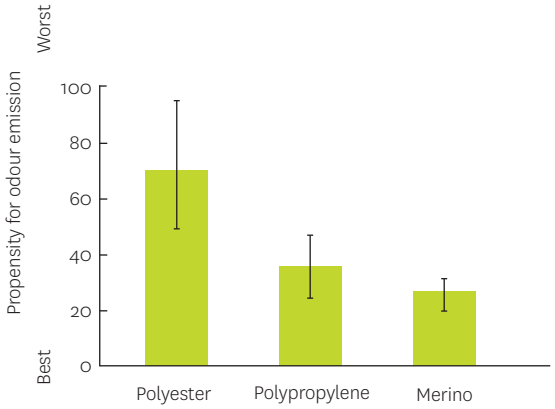


Figure 2 above displays the Propensity for odour emission, and the maximum and minimum scores, (depicted by the black lines).

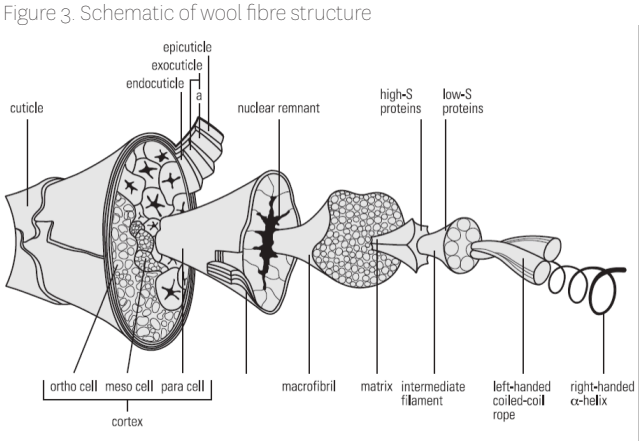
A number of chemical treatments exist to impart a similar level of odour reduction as that provided naturally by wool. These chemistries typically focus on antimicrobial treatments designed to effectively kill bacteria and fungi that are the cause of such odour, and include triclosan, quaternary silanes, polyheximethylene biguanides, and silver (AATCC Review, vol 9, no. 5, 2009).

Given the nature of the chemistry involved, and the often next to skin applications of the garments treated, there are a number of regulatory challenges often associated with their use. There are also potential environmental risks at all stages of the garment's life including manufacture, use, laundering and disposal. Finally, durability can be an issue, particularly when used in applications that involve industrial laundering (AATCC Review, vol 9, no. 5, 2009)

MERINO WOOL SOLUTION

Whilst the mechanics of why merino minimises the build up of odour are not fully understood, factors relating to the physical and chemical complexity inherent in its structure undoubtedly contribute (Figure 3).

Figure 3. Schematic of wool fibre structure



Firstly, a process called 'glass transition' is thought to assist merino's resistance to odour build up. This theory is based on the fact that when immersed in water, or during periods of high humidity (for example during physical exercise), the glass transition temperature of merino drops below that of ambient. When this occurs, the polymeric chains within the merino fibre interact slightly differently and the rate of diffusion of molecules, such as those associated with odour, increases. When the moisture is released from the fibre into the external environment through evaporation, the odour molecules remain trapped within the fibre. If the garment is later laundered, it passes through glass transition once again, and the odour molecules are desorbed into the washing water. In this process odour molecules are neutralised by fabric in use and are later removed completely through washing.

Merino fibre also has a very complex internal chemistry and binds many of the acidic, basic and sulphurous molecules that are components of body odour. It is a known absorber of such classes of compound, as well as of aldehydes (Figure 4), which are also highly odouriferous (Causer et al 1995).

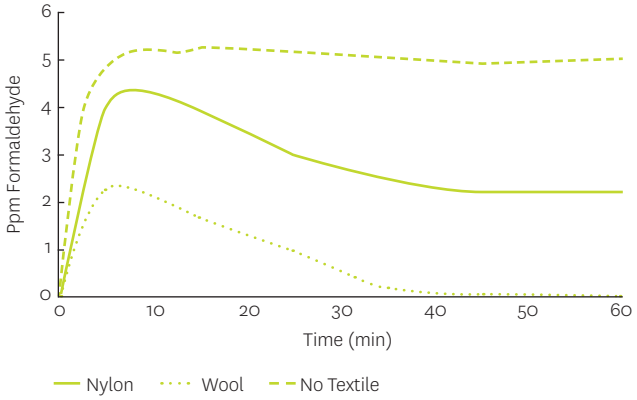


Figure 4. Propensity for odour emission after wear

It is also contended that some binding mechanism exists as suggested by studies (McQueen et al 2007a) that show much lower discernable odour in merino than in synthetic or cotton garments, despite similar bacterial loadings. Moreover, this odour suppressing effect was evident even when bacterial loadings were higher in wool (McQueen et al 2007a).

SUMMARY

Body odour arises as a by-product of bacteria, which proliferate in warm moist environments for example, when sweat is allowed to remain on the skin for an extended period of time. Merino fibre, through its complex chemical and physical structure, resists the development and proliferation of odour.

Odour molecules are absorbed into merino fibre, effectively becoming trapped and less readily detected by the human nose. Odour molecules trapped within the fibre can then be removed during laundering.

The internal chemistry of merino fibre binds acidic, basic and sulphurous molecules, which are significant components of body odour, making them difficult to detect by the human nose.

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